**Claims after this response:**

1(Currently Amended). A method for operating a computer to generate ~~generating~~ a ~~model of~~ simulator component that models a first circuit having an input port and an output port in a circuit simulator, said circuit simulator providing a simulated signal comprising a modulated carrier to said simulator component and generating an output indicative of the behavior of a second circuit that contains said first circuit when such a modulated carrier is input to said input port, said method comprising:

determining an amplitude for a current leaving said output port of said first circuit at a frequency $\omega_k$ when a signal comprising a carrier at $\omega_j$ modulated by a signal $V_j(t)$ is input to said input port, wherein $\omega_k$ is a harmonic of $\omega_j$; and

using said determined amplitude to determine values for a set of constants, $\mathbf{a}^k$, such that a function $f_k(\mathbf{V},\mathbf{a}^k)$ provides an estimate of the current, $I_k(t)$, leaving said output port at a frequency $\omega_k$ when a signal having the form

$$V(t) = \mathrm{Re}\sum_{k=1..H} V_k(t)\exp(j\omega_k t)$$

is input to said input port of said first circuit by said circuit simulator, where $V_k(t)$ is a component of ~~the~~ a set of values $\mathbf{V}$, wherein H is an integer greater than 0; and

~~providing a simulator component adapted for use in a circuit simulator,~~ wherein said simulator component ~~having~~ has a first simulator input port and a simulator output port, said simulator component returning a signal value~~,~~ determined by said $f_k(\mathbf{V},\mathbf{a}^k)$, via said simulator output port to said circuit simulator when said circuit simulator provides values for $\mathbf{V}$ at said first simulator input port for at least one value of k.

2(Currently Amended). The method of Claim 1 wherein said simulator component also return a value equal to $f_k(\mathbf{V},\mathbf{a}^k)$ via said simulator output port when said circuit simulator provides values for $\mathbf{V}$ at said first simulator input port for at least two values of k.

3(Original). The method of Claim 1 wherein said amplitude is determined by applying an electrical signal to said circuit and measuring a signal at said output port.

4(Original). The method of Claim 1 wherein said amplitude is determined on a circuit simulator by simulating an electrical signal being applied to said circuit.

5(Original). The method of Claim 1 wherein said circuit simulator is a transient envelope simulator.

6(Currently amended). The method of Claim 1 wherein said set of constants, $a^k$, ~~$f_k(V,a_k)$~~ is ~~evaluated~~ determined by a neural network that was trained with a training set comprising said determined amplitude.

7(Original). The method of Claim 6 wherein $f_k(V,a^k)$ comprises a weighted sum of basis functions.

8(Currently Amended). The method of Claim 1 wherein $f_k(V,a^k)$ further depends on an input derived from V and wherein said simulator component further comprises a second simulator input port and

a computational component having a component input port and a component output port, said component input port being connected to said first simulator input port and said component output port being connected to said second simulator input port, said computational component generating ~~a signal~~ said input derived from V on said component output port when said second simulator input port receives a signal specifying V.

9(Currently Amended). The method of Claim ~~3~~ 8 wherein said ~~signal~~ input generated by said computational component further depends on the time derivative of $I_k(t)$ for at least one value of k.

10(Original). The method of Claim 8 wherein said computational component comprises a circuit component that is provided in a simulator component library.

11(Currently Amended). A method for operating a computer to generate ~~generating~~ a ~~model of~~ simulator component that models a first circuit having an input port and P output ports in a circuit simulator, said circuit simulator providing a signal comprising a modulated carrier to said simulator component, where P>1, said method comprising:

determining an amplitude for a current leaving each output port of said first circuit at a frequency $\omega_k$ when a signal comprising a carrier at $\omega_j$ modulated by a signal $V_j(t)$ is input to said input port, wherein $\omega_k$ is a harmonic of $\omega_j$; and

using said determined amplitude to determine values for a set of constants, ${}^{p}\mathbf{a}^{k}$, such that a function $\mathbf{f}^{p}_{k}(\mathbf{V},\mathbf{a}^{k})$ provides an estimate of the current, $I^{p}_{k}(t)$, leaving said $p^{th}$ output port at a frequency $\omega_k$ when a signal having the form

$$V(t) = \mathrm{Re}\sum_{k=1,H} V_k(t)\exp(j\omega_k t)$$

is input to said input port of said first circuit, where $V_k(t)$ is a component of the set of values V; wherein H is an integer greater than 0; and

~~providing a simulator component adapted for use in a circuit simulator,~~ wherein said simulator component ~~having~~ has a first simulator input port and P simulator output ports, said simulator component returning a value, determined by $f^{p}_{k}(V,a^{k})$, via said $p^{th}$ simulator output port when said circuit simulator provides values for V at said first simulator input port for at least one value of k and p, said simulator component allowing said circuit simulator to provide an output indicative of the behavior of a second circuit containing said first circuit.